

4.5.93

#### PROJECT MEMORANDUM

DATE:

April 5, 1993

TO:

Joe Depner, Hydrogeologist

FROM:

Nels Cone, Chemist

SUBJECT:

DATA VALIDATION OF ANALYTICAL RESULTS FROM PIER 91 RCRA

FACILITY INVESTIGATION, PROJECT 624878, DATA SET #8C

During the period of January 18 to February 9, 1993, soil samples were collected by Burlington Environmental field personnel. These samples were submitted to Burlington Corporate Laboratory for metals analysis (EPA SW-846 Method 6010) and PCBs analysis (EPA SW-846 Method 8080 modified) (work orders 44363, 44827, 44663, and 44469). I performed a review of the analytical results for the following samples:

CP-122A-DW

CP-122AC-6-8 CP-122B-2-4 CP-115B-18-20 CP-106B-2-4

CP-106B-18-20

CP-122AC-2-4

CP-122AC-22-24 CP-122B-6-8

CP-115B-36-38 CP-106B-6-8

Properly completed chain-of-custody forms were included, along with documented signatures from field to laboratory receipt. The samples were shown as having been properly iced and received in Holding times were clearly written and evaluated according to regulatory good condition. protocol (National Functional Guidelines for Organic (and Inorganic) Data Review, USEPA, 1991). The samples received the analyses as required by the Quality Assurance Project Plan (OAPP), and laboratory extraction/analysis times met the established guidelines.

Method blank data met acceptable quality control (QC) limits. All laboratory control samples, post digestion spike recoveries, PCB surrogate recoveries, initial calibration verification, and continuing calibration verification met requisite QC criteria.

Matrix spike/matrix spike duplicate analyses displayed analytical accuracy within required guidelines, with the exception of selenium recoveries on samples CP-115B-36-38 and CP-115B-18-20. Regardless, the data quality objectives as defined in Table F-2 of the QAPP are met. Accordingly, this data set can be considered valid for its intended use.

NC/rlk/b46:2193b.mem



# RECEIVED

MAR 1 8 1993

Burlington Environmental Inc. Technical Services

March 17, 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 44363

#### Dear Joe:

Five soil samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory January 20, 1993. The samples were received in good condition. The samples were analyzed for total metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%.

Laboratory Number(s)	GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
44363-1,2,3,4,5, QC1260, and B01213-1	AAKG and BAKH	1/21/93	1/25/93 and 1/27/93

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	<u>Analyst</u>	Instrument Make and Model
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic
		Absorption Spectrometer
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma
Chromium, Nickel, Zinc		Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Laboratory Manager

Burlington Environmental Inc.

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## General Laboratory Report

: 44363 Lab Number

Plant/Generator Name : Pier 91; Project #624878; Task #7304

: Soils; CP-122B and CP-122AB Sample Type

Sample Type
Date of Receipt : 01/20/93 : 03/17/93 Analyst: BLW, BB, EL, GCH

Parameters for Analysis: Total Metals, PCBs
Outside Lab Outside Lab Report No:

#### Data:

These soil samples from the Pier 91 project 624878, task 7304, labeled CP-122B-2-4, CP-122B-6-8, CP-122AC-2-4, CP-122AC-6-8, and CP-122AC-22-24, were analyzed for total metals and for PCBs. Copies of the results are attached.

## Comments and Conclusions:



PROJECT NAME BET PIER 91 RF1

210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

## **CHAIN-OF-CUSTODY RECORD**

c.o.c. serial no. 6085

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14363-1	1/18/	1315		X	CP-1228-2-4	1	K	X						K					
14263-2	1/18/9	3 1345		K	CP-122B-6-8	1	*	K						K					
44363-3	119/93	1020		K	CP-1201C-2-4	1	*	4						~					
44363-5	1/19/93			V	CP-122AC-6-8		K	K						K					
44363-5	1/19/9	3	-	¥	CP-122AC-22-24		1	K						K					
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# PCB Laboratory Report Page 1

Lab Number : 44363

Plant/Generator Name : PIER 91 / PJ#624878 TASK 7304
Sample Type : SOIL
Date of Receipt : 01/20/93 Analyst: GCH
Date of Report : 01/27/93 QC Checked: 10
Outside Lab : NONE Outside Lab Receipt Analyst: GCH KWI Outside Lab Report No:

Number of Samples : 5

Run #	Sample ID	Code Numbers	# Drums in Composite	Aroclor #	Total PCB (ppm)
BAKH82	44363-1	CP-122B-2-4			<0.038
BAKH83	44363-2	CP-122B-6-8			<0.039
BAKH84	44363-3	CP-122AC-2-4			<0.045
AAKG19	44363-4	CP-122AC-6-8			<0.040
AAKG20	44363-5	CP-122AC-22-24			<0.041
AAKG31	QC 1260	ADVISORY RANGE (6.6-24)		1260	12.
3.77000	D01010 1	BLANK			<0.1
AAKG22	B01213-1	A1254		5.23	105%
AAKG15	CCV			4.87	97%
AAKG23	CCV	A1254		4.99	100%
AAKG28	CCV	A1248		4.31	86%
AAKG29	CCV	A1254			92%
AAKG30	CCV	A1260		4.61	93%
AAKG41	CCV	A1248		4.67	
BAKH81	CCV	A1254		5.77	115%
BAKH90	CCV	A1254		5.74	115%

Lab Number

: 44363

Plant/Generator Name : PIER 91 PJ# 624878 TASK 7304

Sample Type

: SOIL

Date of Receipt

: 01/20/93

Analyst: BLW, BB, EL QC Checked: Lune Spullet 2/5/75

Date of Report

: 02/08/93

Parameters for Analysis: TOTAL METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3050, 6010, 7000.

	44363-1	44363-2	44363-3 CP-122AC-2-4	44363-4 CP-122AC-6-8
Metals: Silver Arsenic Barium Beryllium Cadmium Chromium Copper Mercury Nickel Lead Selenium Zinc	CP-122B-2-4  <0.43 3.3 139 <0.21 <0.21 15.2 27.4 0.036 21.1 15.1 <0.22 37.7	CP-122B-6-8 <0.41 2.6 17.2 <0.21 <0.21 12.7 7.3 <0.019 23.6 2.3 <0.39 65.2	<pre></pre>	<0.43 1.8 23.5 <0.21 <0.21 15.3 9.4 <0.019 21.6 6.6 <0.41 30.8
Dry Weight	86.6%	85.6%	73.1%	82.0%

# Comments and Conclusions:

RESULTS ARE REPORTED AS MG/KG DRY WEIGHT.

Lab Number

: 44363

Plant/Generator Name : PIER 91 PJ# 624878 TASK 7304

Sample Type

: SOIL

Date of Receipt : 01/20/93
Date of Report : 02/08/93
Parameters for Analysis: TOTAL METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3050, 6010, 7000.

44363-5

44202-2
CP-122AC-22-24
<0.41
1.9
11.9
<0.21
<0.21
15.5
4.5
0.022
17.8
1.6
<0.21
16.0
80.2%

# Comments and Conclusions:

RESULTS ARE REPORTED AS MG/KG DRY WEIGHT.

Lab Number

: 44363Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

: SOIL

Sample Type
Date of Receipt

: 01/20/93 : 02/08/93

Analyst: BLW, BB, EL, OC Checked: Suph han han 28/93

Date of Report Parameters for Analysis: TOTAL METALS

Outside Lab

: NONE

Outside Lab Report No:

METALS BY SW-846 3050, 6010, 7000.

Metals:	PREPARATION BLANK (MG/L)	LCS PPS-46 % RECOVERY	44363-4 MS % RECOVERY	44363-4 MSD % RECOVERY
Silver	<0.010	81.8	76.2	63.6
Arsenic	<0.10	115.9	90.3	91.9
Barium	<0.20	80.1	93.8	88.9
Beryllium	<0.005	85.9	95.2	95.4
Cadmium	<0.005	83.0	90.5	81.8
Chromium	<0.010	103.2	128.9	81.4
Copper	<0.025	90.6	136.9	94.4
Mercury	<0.0002	73.0*	114.7	106.8
Nickel	<0.040	92.1	119.3	88.0
Lead	<0.050	88.7	105.8	112.0
Zinc	<0.020	90.9	132.8	89.4

## Comments and Conclusions:

RESULTS ARE REPORTED AS MG/L AND PERCENT RECOVERY.

DATES ANALYZED: 1/25/93, 1/27/93, 2/2/93, 2/3/93.

\*MERCURY LCS = SRS003-050

: 443630 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

: SOIL Sample Type

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3050, 6010, 7000.

Metals:	44363-4 PDS % RECOVERY	% RECOVERY ICV	CCV	CCV
Silver	86.2		98.5	99.6
Arsenic		98.6	98.8	97.2
Barium		2010	96.5	96.9
Beryllium			97.1	98.9
Cadmium			97.6	100.9
Chromium	87.7		97.2	99.6
	86.4		99.0	99.2
Copper	80.4	93.7	106.1	96.6
Mercury	89.9	33.7	99.9	104.7
Nickel Lead	69.9	97.3	100.5	103.5
Selenium Zinc	84.7	99.1	96.7	98.0

# Comments and Conclusions:

RESULTS ARE REPORTED AS PERCENT RECOVERY. PDS = POST DIGESTION SPIKE

Lab Number

: 44363Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

: SOIL

Analyst: BLW BB El Charles 2/8/13

Date of Receipt : 01/20/93
Date of Report : 02/08/93 Parameters for Analysis: TOTAL METALS
Outside Lab : NONE

Outside Lab Report No:

METALS BY SW-846 3050, 6010, 7000.

	% RECOVERY		GFAA CCV	GFAA CCV	
Metals: Silver	CCV 100.3	100.5	94.7	98.9	
Arsenic Barium Beryllium Cadmium Chromium Copper Nickel Lead Selenium	98.3 99.8 101.5 99.7 98.2 105.6 101.9	98.3 96.9 94.3 93.8 98.1 103.7 96.1	105.2 90.3	106.4 97.7	
Zinc	99.6	95.7			

Comments and Conclusions:

: 44363Q Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

Sample Type : SOIL

Date of Receipt : 01/20/93 Analyst: BLW BB ELL

Date of Report : 02/08/93 QC Checked Quantity (April 1993)

Parameters for Analysis: TOTAL METALS

Outside Lab

Outside Lab Report No: : NONE Outside Lab

GFAA METALS BY SW-846 3050, 7000.

Metals:	% RECOVERY CCV GFAA	CCV GFAA	ICV GFAA	ICV GFAA	
Arsenic	97.5	95.5	100.7	99.7	
Lead	108.8				
Selenium	94.1	93.1			

# Comments and Conclusions:

: 44363Q Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

: SOIL

Sample Type Date of Receipt Analyst: BLW, BB, EI OV Men 18/93 : 01/20/93 : 02/08/93 Date of Report

Parameters for Analysis: TOTAL METALS

: NONE Outside Lab Report No: Outside Lab

METALS BY SW-846 3050, 6010, 7000.

	PREPARATION	LCS - GFAA
Metals:	BLANK GFAA MG/L	% RECOVERY
Arsenic	<0.010	101.7
Lead	<0.003	100.8
Selenium	<0.005	98.6

Comments and Conclusions:

# BURLINGTON ENVIRONMENTAL

210 West Sand Bank Boad P.O. Box 330 Columbia, It. 62236-0330 618/281-7173

# CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. \_\_\_\_

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# PriorityPollutnT™/CLP Quality Control Standards

Inorganics in Soil

Parameter	Lot Number 212 Certified Value mg/kg	Advisory Range mg/kg
TRACE METALS	*****	(570 1/500
aluminum	11500	6530-16500
antimony	52	0-160
arsenic	15	5.6-25
barium	134	93-174
beryllium	15	9.5-21
cadmium	109	76-142
calcium	7130	4990-9270
chromium	41	20-62
cobalt	211	148-274
copper	20	8.0-32
iron	14500	10100-20150
lead	74	37-111
magnes i um	3620	2530-4710
manganese	310	217-403
	31	15-46
mercury	16	8-0-24
molybdenum	28	8.0-48
nickel	3790	2650-4930
potassium	91	45-136
selenium	37	18-56
silver		173-627
sodium	400	48-150
thallium	99	
vanadium	57	40-74
zinc	53	26-80
CYANIDE	147	74-220

# Certificate of Analysis

#### SOLID WASTE LABORATORY CONTROL SAMPLE

Catalog No: SRS003

Name: Metals on Soil

Lot No: BC003

USE EPA METHOD 3050

Analysis by EPA Method 3050

Arsenic (CAS# 1327-53-3)
Barium (CAS# 7440-39-3)
Cadmium (CAS# 7440-43-9)
Chromium (CAS# 7440-47-3)
Mercury (CAS# 7439-97-6)

30 ± 20 PPM 575 ± 65 PPM 1.3 ± 0.7 PPM 12 ± 5 PPM 6 ± 3 PPM

\*Test methods for evaluating SW846, Third Edition, 1986

Analytical ranges based on interlab 95% confidence levels.

Results based on a dry weight basis.

Manufactured by Resource Technology Corporation for exclusive distribution by FISHER SCIENTIFIC.



Fisher Scientific Chemical Division 1 Reagent Lane Fair Lawn, N.J. 07410 (201) 796-7100



# RECEIVED

MAR 1 8 1993

Burlington Environmental Inc. Technical Services

March 17, 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 44827

Dear Joe:

One soil sample for the Pier 91 Project #624878, Task #7304 was received at our laboratory February 10, 1993. This sample was received in good condition. The sample was analyzed for total metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%.

Laboratory Number(s)	GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
44827, QC1254, and B02113-1	AAKL	2/11/93	2/12/93

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic
		Absorption Spectrometer
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma
Chromium, Nickel, Zinc		Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Kathy E. Kreps
Laboratory Manager

Burlington Environmental Inc.

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## General Laboratory Report

Lab Number : 44827

Plant/Generator Name : Pier 91; Project #624878, Task #7304

Sample Type : Soil; CP-115B-36-38

Date of Receipt : 02/10/93 Analyst: BLW, BB, EL, AFS
Date of Report : 03/17/93 QC Checked: Author Oscal

Parameters for Analysis: Total Metals and PCBs

Outside Lab : None Outside Lab Report No:

#### Data:

This soil sample from the Pier 91 project 624878, task 7304, labeled CP-115B-36-38, was analyzed for total metals and PCBs. Copies of the results are attached.

# Comments and Conclusions:



210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173

## **CHAIN-OF-CUSTODY RECORD**

c.o.c. serial no. 6254

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# PCB Laboratory Report Page 1

: 44827 Lab Number

/ PIER 91 PJ #624878, TASK #7304

Plant/Generator Name: //
Sample Type: SOIL
Date of Receipt: 02/10/93
Date of Report: 02/18/93
Outside Lab: Analyst: AFS Kullan 2/18/93 Outside Lab Report No:

Outside Lab Number of Samples : 1

Run # Sample ID Code # Drums Aroclor # To Numbers in Composite	(ppm)
AAKL37 44827 CP-115B-36-38	<0.042
AAKL39 B02113-1 BLANK	<0.1
AAKM3 QC 1254 TRUE VALUE= 49. 1254 51.0	109%
7	
AAKL36 CCV A1254 (5.0 ppm) 1254 4.95	99%
AAKL40 CCV A1248 (5.0 ppm) 1248 5.02	100%
AAKM2 CCV A1248 (5.0 ppm) 1248 4.55	91%
AAKM4 CCV A1248 (5.0 ppm) 1248 4.85	97%

: 44827 Lab Mumber

Plant/Generator Name : PIER 91 PJ #624878, TASK #7304

: SOIL Sample Type

Analyst: BIW BB. EI Dougton 7/36/93 : 02/10/93 : 02/25/93 Date of Receipt

Date of Report Parameters for Analysis: TOTAL METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3050, 6010, 7000.

Metals:	44827 CP-115B-36-38	44827 MS % RECOVERY	44827 MSD % RECOVERY	% RECOVERY PDS
Silver	<0.41	71.2	70.6	81.9
Arsenic	2.7	119.2	115.2	
Barium	14.2	83.6	86.8	
Beryllium	<0.20	91.4	90.6	
Cadmium	<0.20	82.0	86.0	
Chromium	19.2	70.8	53.4	79.3
Copper	7.9	88.4	86.5	
Mercury	0.029	115.1	119.2	
Nickel	20.2	82.5	75.6	
Lead	1.3	94.3	89.6	
Selenium	<0.41	42.9	37.0	53.9
Zinc	20.4	82.3	79.6	
Dry Weight	78.9%			

## Comments and Conclusions:

RESULTS ARE REPORTED AS MG/KG DRY WEIGHT.

PDS = POST DIGESTION SPIKE

DATES ANALYZED: 2/16/93, 2/17/93, 2/18/93.

Lab Number : 44827Q

Plant/Generator Name : PIER 91 Pj#624878 TASK 7304

Sample Type : SOIL

Date of Receipt : 02/10/93 Analyst: BLW, BB, EL, Date of Report : 02/25/93 QC Checked: Augustia

Date of Report : 02/25/93
Parameters for Analysis: TOTAL METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3050, 6010, 7000.

Metals:	PREPARATION BLANK MG/L	% RECOVERY ICV	% RECOVERY CCV	% RECOVERY CCV
Silver	<0.010		96.6	95.6
Arsenic	<0.010	106.7	97.0	93.9
Barium	<0.20		94.1	94.6
Beryllium	<0.005		96.4	95.9
Cadmium	<0.005		99.1	97.5
Chromium	<0.010		97.2	97.5
Copper	<0.025		98.6	97.0
Mercury	<0.0002		94.8	
Nickel	<0.040		96.4	95.9
Lead	<0.003	97.3	104.4	
Selenium	<0.005	100.1	98.5	94.1
Zinc	<0.020		97.5	96.0

# Comments and Conclusions:

: 448270 Lab Number

Plant/Generator Name : PIER 91 Pj#624878 TASK 7304

: SOIL Sample Type

Analyst: BLW BB, EL QC Checked: Minks Mouldhanding 195/93 : 02/10/93 : 02/25/93 Date of Receipt Date of Report

Parameters for Analysis: TOTAL METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3050, 6010, 7000.

	% RECOVERY	CONTROL PPS-46
Metals:	CCV	% RECOVERY
Silver		77.8
Arsenic	90.2	103.9
Barium		76.6
Beryllium		79.9
Cadmium		74.3
Chromium		96.4
Copper		90.0
Mercury		102.5
Nickel		85.2
Lead		95.1
Selerium	92.6	95.2
Zinc		91.4

# Comments and Conclusions:





# PriorityPollutnT™/CLP Quality Control Standards

Inorganics in Soil

	Lot Number 212	
Parameter	Certified Value	Advisory Range
	mg/kg	mg/kg
TRACE METALS		
aluminum	11500	6530-16500
antimony	52	0-160
arsenie	15	5.6-25
barium	134	93-174
beryllium	15	9.5-21
cadmium	109	76-142
calcium	7130	4990-9270
chromium	41	20-62
cobalt	211	148-274
copper	20	8.0-32
iron	14500	10100-20150
lead	74	37-111
magnesium	3620	2530-4710
manganese	310	217-403
mercury	31	15-46
molybdenum	16	8-0-24
nickel	28	8_0-48
potassium	3790	2650-4930
selenium	91	45-136
silver	37	18-56
sodium	400	173-627
thallium	99	48-150
vanadium	57	40-74
zinc	53	26-80
CYANIDE	147	74-220



210 West Sand Bank Road P.O. Hox 330 Columbia, IL 62236-0330 618/281-7173

# **CHAIN-OF-CUSTODY RECORD**

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MAR 1 8 1993

Burlington Environmental Inc.
Technical Services

March 17, 1993

Joe Depner
Burlington Environmental Technical Services
2203 Airport Way South, Suite 400
Seattle, WA 98134

Project: Pier 91 Project #624878, Task #7304

Burlington Environmental Corporate Laboratory Number 44663

#### Dear Joe:

One soil sample for the Pier 91 Project #624878, Task #7304 was received at our laboratory February 3, 1993. This sample was received in good condition. The sample was analyzed for total metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%.

Laboratory Number(s)	GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
44663, QC1260, and B02053-2	AAKK and BAKK	2/5/93	2/8/93

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	Analyst	Instrument Make and Model
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic Absorption Spectrometer
Silver, Barium, Cadmium, Copper, Chromium, Nickel, Zinc	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Kathy E. Kreps Laboratory Manager

Burlington Environmental Inc.

athy E Dups

enclosure



#### General Laboratory Report

: 44663 Lab Number

Plant/Generator Name : Pier 91; Project #624878, Task #7304

: Soil; CP-115B-18-20 Sample Type

Date of Receipt : 02/03/93 Analyst: BLW, EL, BB, GCH
Date of Report : 03/17/93 QC Checked: Analyst: BLW, EL, BB, GCH
Date of Report : 03/17/93

Parameters for Analysis: Total Metals and PCBs
Outside Lab : None Outside Lab Report No:

#### Data:

This soil sample from the Pier 91 Project 624878, task 7304, labeled CP-115B-18-20, was analyzed for Total Metals and for PCBs. Copies of the results are attached.

# Comments and Conclusions:



210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

# **CHAIN-OF-CUSTODY RECORD**

c.o.c. serial no. 6252

PROJECT SAMPLER LAB DEST	PROJECT NAME BET PILE 91 RF1  PROJECT NUMBER 624878 MAJOR TASK 7304  SAMPLERS J. PEYALE  LAB DESTINATION BET  SAMPLE DATE TIME SER SAMPLE LOCATION  NO.														_	PRESER- VATIVES	(CHEMIC FORM N	REMA CAL ANAI NUMBER	IRKS LYSIS REQU IF APPLICAI	JEST BLE)
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## PCB Laboratory Report Page 1

Lab Number : 44663

Plant/Generator Name : PIER 91 / PJ #624878, TASK #7304
Sample Type : SOIL
Date of Receipt : 02/03/93 Analyst: GCH
Date of Report : 02/10/93 QC Checked:
Outside Lab : Outside Lab Report
Number of Samples : 1 Analyst: GCH 2/10/93 QC Checked: 2/10/93 Outside Lab Report No:

Run #	Sample ID	Code Numbers	# Drums in Composite	Aroclor #	Total PCB (ppm)
AAKK10	44663	CP-115B-18-20			<0.043
AAKK12	B02053-2	BLANK			<0.1
BAKK65	QC 1260	1260 (ADVISORY RANGE 6.1-25)		1260	16.
AAKK9	CCV	1248		5.06	101%
AAKK13	CCV	1254		5.41	108%
BAKK64	CCV	1248		5.17	103%
BAKK66	CCV	1254		5.37	107%

INSTRUMENT = HP 5890 GC

ANALYST = GWENDOLYN C. HUGGINS

: 44663 Lab Number

Plant/Generator Name : PIER 91 PJ #624878, TASK #7304

: SOIL Sample Type

Analyst: BLW, El, BB Date of Receipt : 02/03/93 Date of Report : 02/17/99

Parameters for Analysis: TOTAL METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3050, 6010, 7000.

25-2-1	44663 CP-115B-18-20	44663 MS % RECOVERY	44663 MSD % RECOVERY	PDS % RECOVERY
Metals: Silver	<0.41	65.2	67.0	89.5
Arsenic	2.3	82.4	59.5	
Barium	14.6	91.0	88.2	
Beryllium	<0.20	91.8	92.2	
Cadmium	<0.20	82.8	83.6	
Chromium	21.2	112.9	126.5	87.9
Copper	7.0	93.4	95.8	
Mercury	0.026	106.9	111.6	
Nickel	23.4	103.7	109.0	
Lead	2.4	84.2	84.6	
Selenium	<0.48	21.2	31.2	
Zinc	18.6	103.0	106.2	
Dry Weight	76.5%			

Comments and Conclusions:

RESULTS REPORTED AS MG/KG DRY WEIGHT. PDS = POST DIGESTION SPIKE

: 44663Q Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

: SOIL Sample Type

Date of Receipt

: 02/03/93 : 02/17/93 Analyst: BLW, EL QC Checked: Date of Report

Parameters for Analysis: TOTAL METALS

Outside Lab Repo#t No: : NONE Outside Lab

METALS BY SW-846 3050, 6010, 7000.

Metals:	PREPARATION BLANK	% RECOVERY PPS-46	ICV % RECOVERY	CCV % RECOVERY
Silver	<0.010	78.4		99.7
Arsenic	<0.010	111.6	108.4	95.0
Barium	<0.20	88.0		96.9
Beryllium	<0.005	81.3		97.9
Cadmium	<0.005	74.5		103.0
Chromium	<0.010	107.6		100.7
Copper	<0.025	88.0		98.0
Mercury	<0.0002	74.3*		92.6
Nickel	<0.040	84.3		103.2
Lead	<0.050	82.2		104.0
Selenium	<0.005	101.2	106.8	90.8
Zinc	<0.020	88.9		99.7

# Comments and Conclusions:

RESULTS FOR BLANK IN MG/L. \* MERCURY CONTROL SAMPLE SRS003-50. DATES ANALYZED: 2/9/93, 2/12/93.

Lab Number

: 44663Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

Sample Type

: SOIL

Date of Receipt

: 02/03/93

Analyst: BLW, EI

Report No:

Date of Report

: 02/17/93

QC Checked:

Parameters for Analysis: TOTAL METALS

Outside Lab

: NONE

Outside Lab

METALS BY SW-846 3050, 6010, 7000.

25-1-2-	CCV % RECOVERY	CCV % RECOVERY
Metals:		
Silver	97.8	00.4
Arsenic	95.4	98.4
Barium	95.3	
Beryllium	98.0	
Cadmium	103.6	
Chromium	99.2	
Copper	96.6	
Nickel	106.8	
Lead	101.8	
Selenium	91.8	
Zinc	99.2	

# Comments and Conclusions:





# PriorityPollutnT™/CLP Quality Control Standards

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Inorganics in Soil

	Lot Number 212	
Parameter	Certified Value	Advisory Range
	mg/kg	mg/kg
TRACE METALS		
aluminum	11500	6530-16500
antimony	52	0-160
arscnic	15	5.6-25
barium	134	93-174
beryllium	- 15	9.5-21
cadnium	109	76-142
calcium	7130	4990-9270
chcomium	41	20-62
cobalt	211	148-274
copper	20	8.0-32
iron	14500	10100-20150
lead	74	37-111
magnesium	3620	2530-4710
manganese	310	217-403
mercury	31	15-46
motybdenum	16	8.0-24
nickel	28	8_0-48
potassium	3790	2650-4930
selenium	91	45-136
silver	37	18-56
sodium	400	173-627
thallium	99	48-150
vanadium	57	40-74
zinc	53	26-80
ZIRC		40 40
CYANIDE	147	74-220

# Certificate of Analysis

#### SOLID WASTE LABORATORY CONTROL SAMPLE

Catalog No: SRS003 Name: Metals on Soil

Lot No: BC003 USE EPA METHOD 3050

Analysis by EPA Method 3050

Arsenic (CAS# 1327-53-3) 30 ± 20 PPM
Barium (CAS# 7440-39-3) 575 ± 65 PPM
Cadmium (CAS# 7440-43-9) 1.3 ± 0.7 PPM
Chromium (CAS# 7440-47-3) 12 ± 5 PPM
Mercury (CAS# 7439-97-6) 6 ± 3 PPM

Test methods for evaluating SW846, Third Edition, 1986

Analytical ranges based on interlab 95% confidence levels.

Results based on a dry weight basis.

Manufactured by Resource Technology Corporation for exclusive distribution by FISHER SCIENTIFIC.



Fisher Scientific Chemical Division 1 Reagent Lane Fair Lawn, N.J. 07410 (201) 796-7100

# ENVIRONMENTAL

210 West Sand Bank Road P O Box 330 Columbia, It. 62236-0330 618/281-7173

# CHAIN-OF-CUSTODY RECORD

C.O.C. SERIAL NO. \_

PROJECT PROJECT SAMPLER LAB DEST	NAME B NUMBER S J. P.	6248) 1248) 1965 1861	291	ef	MAJOR TASK 7304	NO. OF CONTAINERS	AND E OF	\$ 1 X X X X X X X X X X X X X X X X X X	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	RESER-	(CI	ICA HOAL	REMARI ANALY IBER IF	KS SIS REQUE APPLICABI	ST LE)
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# RECEIVED

MAR 1 8 1993

Burlington Environmental Inc. Technical Services

March 17, 1993

Joe Depner Burlington Environmental Technical Services 2203 Airport Way South, Suite 400 Seattle, WA 98134

Project: Pier 91 Project #624878, Task #7304 Burlington Environmental Corporate Laboratory Number 44469

Dear Joe:

One water and three soil samples for the Pier 91 Project #624878, Task #7304 were received at our laboratory January 26, 1993. The samples were received in good condition. The samples were analyzed for total metals and PCBs at the Burlington Environmental Corporate Laboratory.

All samples were extracted and analyzed within EPA SW-846 required holding times. Analysis dates and extraction dates (as applicable) are included in the metals report. The PCBs were extracted and analyzed in batchs. These dates are tabulated below. All PCB surrogates recovered between 50% and 150%.

Laboratory Number(s)	GC Run Number(s)	Date(s) Extracted	Date(s) Analyzed
44469-1,2,3,4, QC1248,	AAKK and BAKK	1/26/93	1/28/93
B01263-1and B01263-2			

The analyst(s) name(s) and the instrument used for each analyte are specified on the PCB report and are listed below for the metals analytes.

Analyte(s)	<u>Analyst</u>	Instrument Make and Model
Mercury	Barbara L. Walker	Perkin Elmer 50B Mercury Analyzer
Arsenic, Selenium, Lead	Bruce Bell	Perkin Elmer 5100Z Graphite Furnace Atomic
		Absorption Spectrometer
Silver, Barium, Cadmium, Copper,	Eric Larson	Leeman Labs PS3000 Inductively Coupled Plasma
Chromium, Nickel, Zinc		Atomic Emission Spectrometer

All analyses were conducted according to EPA SW-846 Methods specified in the work plan. Additional analytical and quality control information is included in the attached analytical reports.

Sincerely,

Kathy E. Kreps
Laboratory Manager

Burlington Environmental Inc.

Kalky E Keps

enclosure



#### General Laboratory Report

: 44469 Lab Number

Plant/Generator Name : Pier 91; Project #624878, Task #7304 : Water & Soils; CP-122A and CP-106B Sample Type

: 01/26/93 Analyst: BLW, EL, BB, GCH Date of Receipt

Date of Report : 03/17/93 QC Check Parameters for Analysis: Total Metals and PCBs QC Checked: Nathu Kies 3/19/93

: None Outside Lab Report No: Outside Lab

#### Data:

These water and soil samples from the Pier 91 Project 624878, Task 7304, labeled CP-122A-DW, CP-106B-2-4, CP-106B-6-8, and CP-106B-18-20, were anlayzed for PCBs and for Total Metals. Copies of the results are attached.

Comments and Conclusions:



210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

## **CHAIN-OF-CUSTODY RECORD**

c.o.c. SERIAL NO. 6251

618/281-5120											•										
PROJECT	NAME	BET	Ple	TR 1	91	RFI			4	5 00	13	7	7	7	7	7	/	PRESER	- /		
PROJECT	NUMBER	624	878	<u> </u>		MAJOR TASK 7304		S	ANA, EOF	\Z							/ V	ATIVES			
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	125/9	3 132	5		4	CP-106B-2-4		1	a	4						X					
-3		3 134				CP-106B-6-8		1	X	X						K					
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## PCB Laboratory Report Page 1

: 44469 Lab Number

Plant/Generator Name : PIER 91 / PJ #624878, TASK #7304
Sample Type : LIQUIDS & SOILS
Date of Receipt : 01/26/93 Analyst: GCH
Date of Report : 01/29/93 QC Checked: Analyst: GCH W Da

Outside Lab Report No: Outside Lab

Number of Samples : 4

Run #	Sample ID	Code Numbers	# Drums in Composite	Aroclor #	Total PCB (ppm)
BAKH71	44469-1	CP-122A-DW			<0.0001
BAKH72	44469-2	CP-106B-2-4		1260	0.386
BAKH73	44469-3	CP-106B-6-8		1260	0.098
BAKH74	44469-4	CP-106B-18-20			<0.042
BAKH76	B01263-1	BLANK			< 0.0001
BAKH77	B01263-2	BLANK			<0.1
BAKH85	QC 1248	ADVISORY RANGE (11-38)		1248	29.
BAKH70	CCV	A1254		5.51	110%
BAKH79	CCV	A1248		4.89	98%
BAKH81	CCV	A1254		5.77	115%
BAKH90	CCV	A1254		5.74	115%

: 44469 Lab Number

Plant/Generator Name : PIER 91 PJ #624878, TASK #7304

Sample Type : LIQUID & SOILS
Date of Receipt : 01/26/93 Date of Report : 01/08/93 Analyst: BLW, EL QC Checked <

Parameters for Analysis: TOTAL METALS

: NONE Outside Lab Report No: Outside Lab

METALS BY SW-846 3010, 3050, 6010, 7000.

	44469-1	44469-2	44469-3	44469-4
Metals:	CP-122A-DW	CP-106B-2-4	CP-106B-6-8	CP-106B-18-20
Silver	<0.010	<0.42	<0.42	<0.42
Arsenic	<0.010	2.1	1.8	2.0
Barium	<0.20	271.	203.	19.3
Beryllium	<0.005	<0.21	<0.21	<0.21
Cadmium	<0.005	0.27	<0.21	<0.21
Chromium	<0.010	19.8	15.1	20.5
Copper	0.038	54.4	23.1	6.2
Mercury	<0.0002	0.12	0.12	<0.037
Nickel	<0.040	23.8	12.0	22.9
Lead	0.027	298.	111.	2.1
Selenium	<0.005	<0.44	<0.44	<0.22
Zinc	0.20	94.5	54.7	20.4
Dry Weight		91.8%	89.6%	78.8%

# <u>Comments</u> <u>and</u> <u>Conclusions:</u>

RESULTS FOR SAMPLE -1 REPORTED IN MG/L, RESULTS FOR SAMPLES -2, -3, -4 REPORTED IN MG/KG DRY WEIGHT.

: 44469Q Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

: WATER, SOILS Sample Type

: WALER, : 01/26/93 : 02/08/93. Date of Receipt Analyst: BLW, BB Date of Report QC Checked:

Parameters for Analysis: TOTAL METALS

Outside Law Report No: Outside Lab : NONE

METALS BY SW-846 3010, 6010, 7000.

Metals:	PREPARATION BLANK	CONTROL SAMPLE % RECOVERY	44469-1 MS % RECOVERY	44469-1 MSD % RECOVERY
Silver	<0.010	100.7	103.6	102.6
Arsenic	<0.010	92.5	93.0	94.0
Barium	<0.20	97.4	98.2	98.8
Beryllium	<0.005	97.8	99.6	99.6
Cadmium	<0.005	95.6	97.4	96.8
Chromium	<0.010	95.9	100.2	98.2
Copper	<0.025	95.6	120.0	119.4
Mercury	<0.0002	107.5	107.5	103.8
Nickel	<0.040	99.0	101.2	99.2
Lead	<0.003	107.0	98.0	98.0
Selenium	<0.005	110.0	93.6	100.9
Zinc	<0.020	94.3	110.4	95.6

# Comments and Conclusions:

RESULTS ARE REPORTED AS MG/L.

DATES ANALYZED: 1/26/93, 1/29/93, 2/3/93.

: 44469Q Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

Sample Type : WATER, SOILS
Date of Receipt : 01/26/93
Date of Report : 02/08/93 Analyst: BLW, BB QC Checked:

Parameters for Analysis: TOTAL METALS

: NONE Outside Lab Report No: Outside Lab

METALS BY SW-846 3050, 6010, 7000.

Metals: Silver Arsenic Barium	PREPARATION BLANK (MG/L) <0.010 <0.010 <0.20	PPS-46 % RECOVERY 79.9 96.0 85.4	44469-3 MS % RECOVERY 66.0 75.9 94.0	44469-3 MSD % RECOVERY 60.6 67.5 95.8
Beryllium Cadmium	<0.005 <0.005	83.9 78.1	93.4 90.8	94.8 89.2
Chromium Copper	<0.010 <0.025	132.5 92.4	96.5 91.7	61.4 83.6
Mercury Nickel	<0.0002 <0.040	79.3* 89.1 96.8	84.3 82.9 **	78.3 83.6 **
Lead Selenium Zinc	<0.003 <0.005 <0.020	98.6 94.9	59.2 64.4	29.0 90.0

## Comments and Conclusions:

<sup>\*</sup>MERCURY CHECK SAMPLE SRS003-50.

<sup>\*\*</sup>SAMPLE RESULTS GREATER THAN 4X'S THE SPIKE ADDED.

Lab Number : 44469Q

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

Sample Type : WATER, SOILS

Date of Receipt : 01/26/93 Analyst: BLW, BB. EL.

Date of Report : 02/08/93 QC Checked:

Parameters for Analysis: TOTAL METALS

Outside Lab : NONE Outside Lab Report No:

METALS BY SW-846 3050, 6010, 7000.

POST DIGESTION % RECOVERY CCV CCV SPIKE RECOVERY ICV Metals: 101.3 99.7 90.1 Silver 99.7 97.5 Arsenic 100.5 99.8 Barium 99.7 97.6 Beryllium 98.2 104.9 Cadmium Chromium 88.5 102.6 98.4 97.8 95.5 Copper 96.0 Mercury 107.2 98.4 Nickel 109.6 100.0 109.2 Lead 103.3 95.6 98.4 Selenium 95.1 98.6 Zinc 98.6

## Comments and Conclusions:

RESULTS ARE REPORTED AS PERCENT RECOVERY. THIS QC RUN WITH SAMPLE # 44469-1 (H2O). DATES ANALYZED: 1/26/93, 1/29/93, 2/3/93.

: 44469Q Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

Sample Type : WATER, SOILS
Date of Receipt : 01/26/93 Analyst: BLW
Date of Report : 02/08/93 QC Checked:

Parameters for Analysis: TOTAL METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3050, 6010, 7000.

#### % RECOVERY

	9 ICTICO ATTICI				
Metals:	CCV	CCV	CCV	CCV	
Silver	99.7	99.0	97.5		
Arsenic	95.6	92.1	107.3	97.4	
Barium	99.8	97.2	96.4		
Beryllium	97.6	98.6	97.9		
Cadmium	98.2	101.1	100.1		
Chromium	98.4	99.7	97.3		
Copper	95.5	98.6	96.5		
Mercury		96.6			
Nickel	98.4	101.9	99.6		
Lead	101.1	101.3	106.4	109.2	
Selenium	96.0	99.0	90.1	90.5	
Zinc	95.1	100.0	99.1		
4440	J J . 1				

#### Comments and Conclusions:

RESULTS ARE REPORTED IN PERCENT RECOVERY. THIS QC RUN WITH SOIL SAMPLES -2, -3, -4.

DATES ANALYZED: 1/26/93, 1/29/93, 2/1/93, 2/2/93.

: 444690 Lab Number

Plant/Generator Name : PIER 91 Pj# 624878 TASK 7304

Sample Type : WATER, SOILS
Date of Receipt : 01/26/93
Date of Report : 02/08/93 Analyst: BLW QC Checked {

Parameters for Analysis: TOTAL METALS

Outside Lab Report No: : NONE Outside Lab

METALS BY SW-846 3050, 6010, 7000.

% RECOVERY

Metals:	CCV	ICV	ICV	
Arsenic	103.2	102.0	100.0	-
Lead	104.0	98.0	100.0	
Selenium		94.4		

# Comments and Conclusions:

RESULTS ARE REPORTED AS PERCENT RECOVERY. QC RUN WITH SOIL SAMPLES.



PROJECT NAME BET PIER OI RE

MAJORTASK 7-304

PROJECT NUMBER 624878

210 West Sand Bank Road P.O. Box 330 Columbia, IL 62236-0330 618/281-7173 618/281-5120 FAX

## **CHAIN-OF-CUSTODY RECORD**

c.o.c. SERIAL NO. \_\_\_\_625

PRESER-VATIVES

SAMPLER LAB DEST	SJ. P.	M.= B0				NO. OF CONTAINERS	7. 4			/ ,	/ /	/ ,	/ ,	/,	//3	3/	/ (CHEMIC	REMARKS AL ANALYSIS REQ	JEST
SAMPLE NO.	DATE		Como	SpAB	SAMPLE LOCATION		1		ch					1	/	/		UMBER IF APPLICA	BLE)
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-3		1345		-	CP-106B-6-8		K	4						X					
-4	1/25/43	1540		K	CP-106B-18-20	1	1	4						4	ļ				
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SHIPPING NOTES								LAE	NOT	ES					erantani kanasan kunar				

# Certificate of Analysis

#### SOLID WASTE LABORATORY CONTROL SAMPLE

Catalog No: SRS003

Name: Metals on Soil

Lot No: BC003

USE EPA METHOD 3050

Analysis by EPA Method 3050

Arsenic (CAS# 1327-53-3) 30 ± 20 PPM
Barium (CAS# 7440-39-3) 575 ± 65 PPM
Cadmium (CAS# 7440-43-9) 1.3 ± 0.7 PPM
Chromium (CAS# 7440-47-3) 12 ± 5 PPM
Mercury (CAS# 7439-97-6) 6 ± 3 PPM

Test methods for evaluating SW846, Third Edition, 1986

Analytical ranges based on interlab 95% confidence levels.

Results based on a dry weight basis.

Manufactured by Resource Technology Corporation for exclusive distribution by FISHER SCIENTIFIC.



Fisher Scientific Chemical Division 1 Reagent Lane Fair Lawn, N.J. 07410 (201) 796-7100





# PriorityPollutnT™/CLP Quality Control Standards

Inorganics in Soil

	LOT MUMDER 212	
Parameter	Certified Value	Advisory Range
	mg/kg	mg/kg
TRACE METALS		
aluminum	11500	6530-16500
antimony	52	0-160
arscnic	15	5.6-25
barium	134	93-174
beryllium	15	9.5-21
cadmium	109	76-142
calcium	7130	4990-9270
chromium	41	20-62
cobalt	211	148-274
copper	20	8.0-32
iron	14500	10100-20150
lead	74	37-111
magnesium	3620	2530-4710
manganese	310	217-403
mercury	. 31	15-46
molybdenum	16	8.0-24
nickel	28	8.0-48
potassium	3790	2650-4930
selenium	91	45-136
silver	37	18-56
sodium	400	173-627
thallium	99	48-150
vanadium	57	40-74
zinc	53	26-80
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CYANIDE	147	74-220